Alberding GNSS data management & monitoring tools

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Outline

Alberding GmbH

GNSS data management utilities

Professional monitoring solutions
Who is Alberding GmbH?

• Privately owned German GNSS software development company
• Founded in 1994
• Based in Schönefeld (Berlin)
• 9 engineers + external employees
• Independent from GNSS receiver manufacturers
Alberding GmbH experience

- GNSS data processing and analysis
- Internet based GNSS data communication
- Standardisation (Ntrip, RTCM MSM, SSR)
- Customised software and hardware development
- Complete system solutions
  - GNSS infrastructures
  - Monitoring systems
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**GNSS data management utilities**

Professional monitoring solutions
Plethora of signals and data formats

- Increasing need for "translator" applications
DataConv

- Data conversion tool

**Raw data** → **DataConv** → **RTCM, CMR** → **RINEX**

- **RTCM** 2.x
- **RTCM 3.x**
- **SSR**
- **MSM** (GPS, GLONASS, Galileo, BeiDou, QZSS, SBAS)

- **CMR**
- **CMR+**

- **RINEX 2.11**
- **RINEX 3.02** (incl. G, R, E, etc. nav files)

- Leica
- Trimble
- Topcon
- Ashtech
- Septentrio
- Javad
- NovAtel
- Hemisphere GPS
- etc.

- Real-time streams (TCP/UDP/Ntrip/serial)
  and file input
- Linux and Windows versions
DataConv

- Data conversion tool

Raw data $\rightarrow$ DataConv $\rightarrow$ RTCM, CMR

RTCM $\rightarrow$ DataConv $\rightarrow$ CMR, RINEX
DataConv

- Data conversion tool

- Raw data → DataConv → RTCM, CMR, RINEX
- RTCM → DataConv → CMR, RINEX
- RTCA (EGNOS / EDAS) → DataConv → RTCM ("EGNOS VRS")
InspectRTCM

- RTCM visualisation software for data content analysis

RTCM binary

InspectRTCM

RTCM ASCII

- Real-time visualisation
- RTCM, CMR, RTCA, raw binary input
- NMEA GGA sending
- Transmission delay analysis

- Real-time streams (TCP/UDP/Ntrip/serial) and file input
- Linux and Windows versions
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GNSS data management utilities

Professional monitoring solutions
What and how to monitor?

**What do we monitor:**
- Data availability, age and content
- Satellite tracking performance
- Position
- Accuracy
- Object geometry
- Motion and deformation
- Operating status

**How do we monitor:**
- GNSS receivers (single- or dual-frequency, GPS-only or GPS+GLO), total stations, laser scanners, geotechnical and meteorological sensors
- Single- or multi-station architectures
- Centralised or decentralised configurations
- Post-processed or real-time analysis
- Various GNSS processing techniques (DGNSS, RTK, PPP)
- Accuracies: sub-metre to <1 cm
- Sampling rates: up to 10 Hz or more
Alberding monitoring software features

- Scalable solution
- Modular architecture
- Web based graphical user interface
  - Comprehensive status tables
  - Time series and scatter plots
  - Availability bar graphs
  - Map display of stations and users
  - Statistical tables
  - Comparative performance evaluation
- Automated alert system (email/SMS)
- Status report generation
Post-processed PPP monitoring

- Reference station coordinates
- Independent from the RTK networking algorithms
- Post processing of 24h RINEX files
- Web based status monitoring
- History data on time series plots
- Comparative analysis, differential plots
- Customisable alarm generation
Real-time PPP monitoring

- Real-time raw data input
- RTCM 3.x SSR input (e.g. IGS combined RT products)
- Various PPP algorithms (Alberding PPP, BNC, RTKLIB)
- Comparative analysis (between stations or between orbit/clock products or between PPP algorithms)
- Custom display settings
- Statistical computations
Real-time PPP monitoring cont’d
PPP convergence time analysis

- Repeated re-convergence
- Statistical analysis
RTK TTFA analysis

- Central or rover fw based RTK position computation
- Various RTK/Network RTK solutions
- Comparative analysis (between stations or between processing concepts)
- Repeated re-initialisation
- Statistical computations
- Wrong fix detection
Ntrip Caster monitoring

- Data stream availability and content analysis (RTCM, CMR, raw data)
- Data age analysis
- Monitoring third party casters
- Monitoring multiple casters from a single website
- Colour-coded status tables and bar graphs
- User-defined sampling rate and alarm thresholds
BKG Ntrip Caster web interface
Alberding Ntrip Caster user map display

- User NMEA GGA messages
- Map display of real-time position information and quality indicators
- Fleet management
- E.g. agricultural machinery
Alberding Ntrip Caster user map display

- History data analysis
- KML file generation – map display
- Colour-coded RTK fixing status indicator
- Troubleshooting assistance (e.g., correction reception issues)
Future developments

• Alberding GmbH is committed to support the increasing versions of RTCM 2.x, 3.x, RINEX 3.xx and other standard formats

• Ambiguity-fixed PPP positioning with regional augmentation
  Goal: instantaneous cm accuracy using state space algorithms
Thank you for your attention!

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IGS RT Service availability monitoring

Real-time Service

Product Quality

RTS Status

Status and historical information regarding the availability of IGS Real-time Service product streams is available through the RTS Product Distribution Center at BKG.
Currently supported:

**InspectRTCM:**
- RTCM, RTCM3 (nearly 100%)
- CMR (100%)
- CMR+ (except GLONASS-Trimble)
- CMRx and consorts (only type numbers)
- Javad (many important messages)
- Trimble (some important messages)
- SiRF (some important messages)
- NCT (a few messages)
- Raw GPS (100% for old GPS, new signal structure [L2C, L5] missing)
- Raw SBAS (100%)

**Raw data:**
- RTCM3, RTCM3 3.2 (MSM)
- Ashtech raw binary
- Navis BINR
- Hemisphere
- CMR, CMR+, CMR+ Leica GLONASS
- Javad/Topcon GRIL/GREIS (including newest GNSS data)
- Leica LB2 (including newest GNSS data)
- MNP
- NovAtel OEM 3, 4, 5
- RTCM2
- Septentrio SBF (also new GNSS)
- SiRF
- TurboBinary
- Trimble RT17 und RT27 (also new GNSS)
- Trimble dual antenna receivers RT27
- TSIP
- UBLOX
- SOC streaming

For the new GNSS some ephemeris may be missing for some receiver types, but this changes constantly.

On request would be possible:

**InspectRTCM:**
- Raw messages for other GNSS
- More Javad types
- More RT17 Trimble types
- SBF
- More SiRF types
- TSIP
- More RTCM2, RTCM3 (only few missing)
- Navis BINR
- ...

**Raw data:**
- ATOM (Ashtech)
- Ashtech ASCII formats
- Updates for open formats (SBF, RTCM, SiRF, TSIP, UBLOX, NovAtel, ...)

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26/24